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THE KENT INCORPORATED SOCIETY
FOR PROMOTING EXPERIMENTS IN
HORTICULTURE

ADMINISTRATIVE REPORT

(FORTY-FIRST YEAR)

GENERAL DEVELOPMENT AND ACTIVITIES

EAST MALLING RESEARCH STATION

Near MAIDSTONE

KENT

1st October, 1952, to 30th September, 1953

Published April, 1954.

COMMONWEALTH MYCOLOGICAL
14 JUL 1954

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R. E. Hardwick, Esq., Chez Nous Nurseries, Newick, Sussex. (*Appointed September*, 1953.)

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W. Fowle, Esq., Costrong Farm, Kirdford, near Billingshurst, Sussex.

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Appointed by the Senate of the University of London:

Professor Wm. Brown, M.A., D.Sc., F.R.S., The Bush, Haddenham, Aylesbury, Bucks.

Appointed by the University of Bristol:

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M. B. CRANE, Esq., V.M.H., A.L.S., F.R.S., Firs Farm, Haughley, near Stowmarket, Suffolk.

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J. F. TOWNER, Esq., Salts Place Farm, Loose, near Maidstone, Kent.
R. D. WICKHAM, Esq., Gate House Farm, Brenchley, Kent.

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W. P. SEABROOK, Esq., St. Barnabas, Frinton-on-Sea, Essex.

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F. R. TUBBS, Esq., M.Sc., Ph.D.(Lond.), A.R.C.S., D.I.C., F.L.S.

Appointed by the Staff Council of East Malling Research Station:

R. J. GARNER, Esq., M.Sc.(Reading), N.D.H., Dip.Hort.(Reading). (*Resigned May*, 1953.)

S. C. PEARCE, Esq., Ph.D.(Lond.). (*Appointed May*, 1953.)

MEMBERS OF THE EXECUTIVE COMMITTEE

(Governing Members elected at the General Meeting, June, 1951)

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Professor WM. BROWN, M.A., D.Sc., F.R.S.

G. T. COOK, Esq.

L. J. COOK, Esq., A.H.R.H.S.

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W. P. SEABROOK, Esq.

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The Director:

F. R. TUBBS, Esq., M.Sc., Ph.D.(Lond.), A.R.C.S., D.I.C., F.L.S.

The Representative of the Staff Council:

R. J. GARNER, Esq., M.Sc.(Reading), N.D.H., Dip.Hort.(Reading). (*Resigned May*, 1953.)

S. C. PEARCE, Esq., Ph.D.(Lond.). (*Appointed May*, 1953.)

Co-opted Members:

Professor F. G. GREGORY, D.Sc., F.R.S., Imperial College of Science and Technology, South Kensington, S.W.7.

Sir EDWARD SALISBURY, C.B.E., D.Sc., F.L.S., V.M.H., V.P.R.S., 49 Kew Green, Kew, Surrey.

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Captain R. WELLINGTON, M.C., Colescus, Gorran Haven, St. Austell, Cornwall.

STAFF

(1ST OCTOBER, 1953)

Director: F. R. TUBBS,* M.Sc.(Lond.), Ph.D.(Lond.), A.R.C.S., D.I.C., F.L.S.

Assistant to Director: T. N. HOBLYN,* Hort.Dip.(Wye).

Pomology:

W. S. ROGERS,* M.A.(Cantab.), D.Sc.(Lond.), Dip.Hort.(Cantab.), A.Inst.P.
Miss A. B. BEAKBANE, Ph.D.(Lond.), N.D.H.
N. H. GRUBB, M.S.A.(Cornell). *Part-time.*
R. J. GARNER, M.Sc.(Reading), N.D.H., Dip.Hort.(Reading).
D. W. P. GREENHAM, M.A., Ph.D.(Cantab.).
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Miss E. M. GLENN, B.Sc.(Lond.), *Field Records.*
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Miss B. G. MOSSE, B.Sc.(Lond.), Dip.Hort.(Swanley), *Histological Investigations.*
J. E. GOODE, B.Sc.(Birmingham).
J. P. RUXTON, M.A.(Oxon.). (*Resigned August,* 1953.)
R. M. FULFORD, B.Sc.(Birmingham). (*Appointed October,* 1953.)
Miss E. C. THOMPSON.
Miss D. J. WILSON, B.Sc.Hort.(Reading).
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Miss C. P. NICOLL, B.Sc.Hort.(Reading).
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Miss E. KEEP, B.Sc.Hort.(Reading).

Assistants (Scientific):

Miss E. C. M. ASHDOWN.
Miss J. BURTON. (*Resigned August,* 1953.)
Miss S. J. COGGER. (*Resigned September,* 1953.)
Miss F. M. HODGES.
Miss M. TAPLEY.
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Miss J. M. KEMP.
W. J. USBORNE.
Miss H. J. INKPEN.
Mrs. O. B. WENBOURNE.
Miss M. M. FULLER. (*Appointed August,* 1953.)

Statistics:

T. N. HOBLYN.*
S. C. PEARCE, Ph.D.(Lond.). *Deputy Head of Section.*
G. M. JOLLY, B.Sc.(Aberdeen).
G. H. FREEMAN, M.A., Dip.Stat.(Oxon.).
G. E. DAVIES, B.Sc.(Wales), *Biometric Studies.*
D. A. HOLLAND, B.Sc.(Lond.).
Miss M. J. HALL, B.Sc.(Edin.). (*Appointed October,* 1953.)

Assistants (Scientific):

Miss J. M. FULLER. (*Resigned May,* 1953.)
Miss L. V. STICKINGS.
Miss J. A. DOLDING.
Miss S. E. SKINNER. (*Appointed June,* 1953.)

Plant Physiology:

F. R. TUBBS.*
M. C. VYVYAN,* M.A.(Cantab.), D.Sc.(Lond.).
H. W. B. BARLOW, B.Sc.(Edin.). *Deputy Head of Section.*
D. H. MAGGS, B.Sc.(Reading).

* Recognized Teacher of the University of London.

Plant Physiology—continued.

H. J. LACEY, M.Sc.(Nottingham). (*Appointed May*, 1953.)
G. F. TROWELL.
Miss U. HOBDAY. (*Appointed October*, 1952. *Resigned January*, 1953.)

Assistants (*Scientific*) :

Miss J. G. SMITH. B. E. COATES.
Miss S. A. FARTHING. (*Appointed September*, 1953.)
Miss F. C. A. WALLIS. (*Appointed October*, 1952. *Resigned January*, 1953.)

Members of Staff of the Imperial College of Science and Technology working in collaboration with the Physiology Section :

B. D. BOLAS,* D.Sc.(Lond.), D.I.C.
E. S. J. HATCHER, Ph.D.(Bristol).
H. C. RUCK, Ph.D.(Lond.).
C. R. HANCOCK, B.Sc.(Bristol).
F. W. M. LLEWELYN, B.Sc.(Lond.), A.R.C.S.
Miss C. C. MACNAMARA.

Assistants (*Scientific*) :

A. H. GREGORY. (*Resigned December*, 1952).
W. C. C. HADLOW. (*Appointed December*, 1952.)
Miss A. M. SPARY. (*Resigned January*, 1953.)
D. D. B. SUMMERS.

Biochemistry:

W. A. ROACH,* D.Sc.(Lond.), A.R.C.S., D.I.C., A.R.I.C.
A. E. BRADFIELD, D.Sc.(Wales), Ph.D.(Wales), *Organic Chemist.* (*Deceased 3rd May*, 1953.)
A. C. MASON, B.Sc.(Lond.), F.R.I.C., *Physical Chemist.*
F. H. VANSTONE, Ph.D.(Wales), A.Inst.P., *Physicist.*
A. E. FLOOD, M.A.(Cantab.), Ph.D.(Manc.), *Organic Chemist.*
H. J. PHILCOX, F.S.T.A.
Miss A. V. DELAP, B.A., B.Sc.(Dublin), *Botanist.*
Miss E. M. FORD, B.Sc.(Lond.), A.R.C.S., *Assistant Botanist.*

Special Assistant :

Miss M. E. BUNYARD, A.R.R.C.

Assistants (*Scientific*) :

H. HUTCHINS, F.S.T.A.
Miss B. M. KIDWELL.
Mrs. R. D. SOUTER.
R. NEVE.
E. C. WILLS.
Mrs. M. M. CHIDWICK (*née* Miss M. M. ACOTT). (*Resigned May*, 1953.)
Mrs. K. O. BURTON. (*Resigned January*, 1953.)
Miss M. E. JENNER.
Mrs. E. M. TAYLOR.
Miss P. A. NEWMAN.
Miss E. M. H. WILSON.
Miss L. D. GOODGER. (*Appointed April*, 1953.)
Miss K. RUSSELL. (*Appointed August*, 1953.)
Miss J. M. BRADBURY. (*Appointed October*, 1953.)

Plant Pathology:

R. V. HARRIS,* D.Sc.(Lond.), A.R.C.S., D.I.C., M.I.Biol.
M. H. MOORE, M.Sc.(Reading), Ph.D.(Lond.), Dip.Hort. (Reading).
A. F. POSNETTE, M.A.(Cantab.), Ph.D.(Lond.), A.I.C.T.A.

F. W. ANDREWS, D.Sc.(Lond.), Ph.D.(Lond.), A.R.C.S. (*Appointed August,* 1953.)
J. E. CROSSE, B.Sc.(Birmingham).
D. S. KIRKHAM, B.Sc.(Lond.).
P. W. TALBOYS, Ph.D.(Lond.), D.I.C., M.I.Biol.
J. T. LEGG, B.Sc.(Lond.).
Miss M. BENNETT, B.Sc.Hort.(Lond.), Dip.Hort.(Swanley), *Field records; also attached Entomology and Plant Protective Chemistry.*
P. J. ORMEROD, B.A.(Cantab.).
R. CROPLEY, N.D.H.(Hons.), Dip.Hort.(Reading).
Miss E. C. E. ELLENBERGER, B.Sc.Hort.(Lond.).
Miss P. WEBB, B.Sc.(Lond.), *Field records; also attached Entomology and Plant Protective Chemistry.*
J. F. WILSON, B.Sc.(Wales).

Assistants (Scientific):

R. D. SOUTER.
Miss B. I. FLEET. (*Resigned March,* 1953.)
Miss M. M. JOYCE. (*Transferred to Photographic Section, March,* 1953.)
Miss S. SQUIRES. (*Resigned April,* 1953.)
Miss G. W. GOODIER. (*Resigned February,* 1953.)
Miss J. RICHARDSON.
Miss C. R. WESTWOOD.
J. E. STICKELS.
Miss J. KAY. (*Appointed March,* 1953.)
Miss D. SCOTT. (*Appointed March,* 1953. *Resigned June,* 1953.)
Miss W. PHILLIPS. (*Appointed March,* 1953.)
Miss R. GAMBLE. (*Appointed April,* 1953.)
Miss R. A. JENNINGS. (*Appointed June,* 1953. *Resigned October,* 1953.)
K. J. MACEY. (*Appointed September,* 1953.)

Entomology:

A. M. MASSEE,* O.B.E., D.Sc.(Lond.), F.R.E.S.
G. H. L. DICKER, Ph.D.(Lond.), A.R.C.S., F.R.E.S.
M. D. AUSTIN, F.R.E.S., *Red Spider Investigations in Essex.*
R. S. PITCHER, Ph.D.(Lond.), Dip.Agric.(Wye), Dip.Ento.(Wye), *Nematodes.*
Miss D. E. GRIFFIN, B.Sc.(Lond.), A.R.C.S., F.R.E.S., *Bio-assay of Insecticides, attached to Plant Protective Chemistry.* (*Resigned November,* 1952.)
Miss E. COLLYER, Ph.D.(Lond.), *Beneficial Insects of Fruit.*
Miss J. R. GROVES, B.Sc.Hort.(Reading), F.R.E.S., *Codling Moth and other fruit Tortricids.*
R. C. MUIR, B.Sc.(Birmingham), F.R.E.S., *Ecological studies.* (*Appointed October,* 1953.)
J. B. BRIGGS, B.Sc.Hort.(Reading), *Study of the Geometridae.*

Assistants (Scientific):

E. F. SOUTER.
Miss S. O. PHILCOX.
Miss R. HAMMOND. (*Resigned February,* 1953.)
Miss D. V. MERTON. (*Appointed March,* 1953.)
D. K. BROWN. (*Appointed May,* 1953.)

Plant Protective Chemistry: A. H. M. KIRBY, M.Sc.(Lond.), Ph.D.(Lond.), A.R.I.C.
M. ALLEN, B.Sc.(Lond.).
R. P. TEW, A.R.I.C.
R. G. GAMBRILL.
E. L. FRICK, B.Sc.Agric.(Wales).
Miss W. M. PHILLIPS, B.Sc.(Lond.).

For Biological Assistant, see Miss D. E. GRIFFIN, *Entomology Section. (Resigned November,* 1952.)

Assistants (Scientific):

Miss V. M. DREW. *(Resigned May,* 1953.)
Miss R. H. BISHOP.
R. S. LARGE. *(Resigned October,* 1953.)
Miss J. A. HITCHCOCK.
N. A. BECKETT. *(Appointed November,* 1953.)
Miss B. C. BELTON. *(Appointed August,* 1953.)

Fruit Storage Investigations: *(In collaboration with the Ditton Laboratory.)*
H. B. S. MONTGOMERY, B.A.(Dublin), Ph.D.(Lond.), D.I.C.
B. G. WILKINSON, M.A., Ph.D.(Cantab.). *(Appointed September,* 1953.)

Assistant (Scientific):
Miss E. LAWRENCE. *(Appointed August,* 1953.)

Scientific Liaison: H. B. S. MONTGOMERY.
J. H. WALKER, B.Sc.Agric.(Reading).
A. C. PAINTER, O.B.E.
E. G. COKER, B.Sc.Hort.(Lond.), N.D.H.
A. E. H. RUTTER, B.A.(Cantab.), Dip.Agric.(Cantab.). *(Appointed September,* 1953.)

Clerical Assistant:
Miss M. E. EMM.

Assistant (Scientific):
Miss J. C. IRVING.

Meteorological Records: A. P. PRESTON.
G. F. TROWELL.

Librarian: S. R. BALL, B.A.(Lond.), F.L.A.

Photographer: E. YOXALL JONES.

Assistants (Scientific):
Miss D. V. MERTON. *(Transferred to Entomology Section, March,* 1953.)
Miss M. M. JOYCE. *(Transferred from Pathology Section, March,* 1953.)

FARM STAFF.

Farm Supervisor: F. H. VILLIERS, M.Sc.Agric.Econ., B.Sc.Agric.(Reading), N.D.A.
Assistant Plantations Officer: Miss B. F. SEYMOUR.
Experimental Nurseries: T. V. DIXON.
Experimental Greenhouses: M. M. MACNEILL, B.Sc.Hort.(Wye), C.D.H.(Glas.).
A. TIDY.

Farm Staff—continued.

Bradbourne Gardens : Miss G. COUCH.

Workshops : G. WELLER.
F. KING. *Laboratory Instrument Mechanic.*
K. W. G. BUNYARD. *Laboratory Instrument Mechanic.*

Farm Staff with twenty-five years' service :

C. BATES (38).
J. DENYER (33).
E. WENHAM (33).
W. HORTON (31).
J. TANNER (31).
H. CRITTENDEN (30).
E. HAYES (30) (*Caretaker*).
W. HENSON (29) (*Fruit Foreman*).
W. JENNER (27).

ADMINISTRATION.

Secretary : T. R. LITTLEHALES.

Assistant to the Secretary : R. L. OXLEY.

Book-keeper : P. R. WOOD.

Director's Personal Secretary : Miss P. D. S. GOLD.

Clerical Staff : Miss J. M. COY, Miss L. SHERRATT, Miss P. M. RAYFIELD, Miss R. M. WICKHAM, Miss I. CROSS, Mrs. F. J. PARKES (formerly Mrs. F. J. FITNESS), Miss I. BELL, Miss P. RAYFIELD, Mrs. K. D. MILLGATE (*née* Miss K. D. APPS), Miss D. L. CARD, Miss P. M. LINCOLN, Miss G. E. WRIGHT, K. C. GOODWIN, Miss A. SLOMAN, Miss E. MORLEY, Miss D. M. SOLLY, Miss M. GETHIN, Miss W. PHILLIPS (*Appointed October*, 1952 ; *Transferred to Pathology Section, March*, 1953), Miss C. S. KENWARD (*Appointed May*, 1953).

Housekeeper : Miss A. M. BOOTH. (*Appointed October*, 1952.)

VISITORS.

Tours of the Station are arranged by appointment on Tuesday and Thursday afternoons. Visitors with special interests are received by appointment on the mornings of these days and may then join the general tour later if they wish. Wednesdays and Fridays are reserved for visiting research workers who also should make an appointment to ensure that a useful programme for the visit can be prepared.

All visitors wishing to see the work of the Station should go to the Reception Room in the N.F.U. Building at the Research Laboratories.

Visitors coming by road should take the turning to East Malling, opposite " The Bull ", Larkfield, on the main London-Maidstone road. The entrance gate to the Research Station is on the left, opposite the " King and Queen " in East Malling.

Bus Service : From Maidstone by the Maidstone and District Motor Services Limited, every 20 minutes from Maidstone to East Malling.

Passenger Station : EAST MALLING HALT (British Railways, Southern Region).

Goods Station: AYLESFORD (British Railways, Southern Region).

Correspondence : All correspondence should be addressed to the East Malling Research Station, near Maidstone, Kent.

Telephone : West Malling 3033 (3 lines). *Telegrams :* Research, East Malling.

THE COMMONWEALTH BUREAU OF HORTICULTURE AND PLANTATION CROPS

Accommodated at Bradbourne, the Administrative Headquarters of the East Malling Research Station.

STAFF.

Director : D. AKENHEAD, O.B.E., M.A.(Oxon.), B.Sc.Agric.(Lond.).

Consultant Director : F. R. TUBBS, M.Sc.(Lond.), Ph.D.(Lond.), A.R.C.S., D.I.C., F.L.S.

Assistant Director : G. K. ARGLES, Dip.Hort.(Wye), A.I.C.T.A.

Assistants : V. H. GOLDSCHMIDT, Ph.D.(Berlin).
J. DUNDAS, B.Sc.For.(Edin.).
Miss P. J. ROWE-DUTTON, B.Sc.Hort.(Lond.).
Mrs. E. ULYATT, Dip.Hort.(Eisgrub.).

Clerical Staff : Miss M. B. ROGERS, Miss M. M. DURLING, Miss J. E. MORRISON (*Resigned April,* 1953), Mrs. J. WEBB, Miss M. EDWARDS (*Appointed March,* 1953).

NATIONAL AGRICULTURAL ADVISORY SERVICE

Accommodated at Bradbourne, the Administrative Headquarters of the East Malling Research Station.

Telephone : West Malling 2418.

PROVINCIAL ADVISORY OFFICER—FRUIT, SOUTH-EASTERN PROVINCE

W. G. KENT, N.D.H.

Clerical Assistant : Mrs. J. E. WALDREN.

GENERAL DEVELOPMENT AND ACTIVITIES

INTRODUCTORY.

The most important event of the year that this Forty-first Report of the Executive Committee describes is undoubtedly the completion of the first phase of the building scheme. Second only to this is the sanction received to proceed with the second phase, so that the whole programme should be nearing completion by the end of 1954. The Committee cordially endorse the instruction to the Chairman by the Governing Members at the Annual General Meeting to inform the Secretary of the Agricultural Research Council and the Permanent Secretary of the Ministry of Agriculture of their warm appreciation of this sign of their confidence in the Station's work.

While these developments will provide laboratory accommodation sufficient for many years to come, land still remains a problem that does not seem likely to be solved by extension in the near future. Thus we must make the best use of the land we have. Members visiting the Station in 1954 will find that more of the old orchards, no longer of experimental value, have vanished. Special measures to restore the uniformity and fertility of the land that has been released are being tried out, so that it may be brought into experimental use again as soon as possible.

The year is noteworthy for the first distribution on a large-scale of selected root-stocks in the Malling-Merton series, bred in collaboration with the John Innes Horticultural Institution, and tested at East Malling during the last thirty years.

Although the announcement was not made until after the end of the year under review, the Committee would like to take this opportunity of congratulating warmly the Chairman, Mr. T. Neame, on the award of the Victoria Medal of Honour by the Royal Horticultural Society.

OBITUARY.

We regret to record the death, in July 1953, of Mr. D. Curzon Lewis who was appointed as the representative of the East Sussex County Council on our Governing Body only as recently as June 1951.

A Life Founder and Governing Member appointed by the Kent County Council from 1934-42, Mr. W. J. Thomas died in September 1953; while a year previously the Station lost another old friend, Mr. A. Cheal, who had attended regularly the meetings of our Plant Prices Sub-Committee as a representative of the Horticultural Trades' Association since 1943 and given valuable advice in the preparation of the Members' Distribution List.

As the Station itself grows older, it is inevitable that we should lose from time to time some of those who have been associated for long periods with our work; we are none the less sorry for their passing.

GOVERNING MEMBERS.

We welcome to the Governing Body Mr. R. E. Hardwick, who has been nominated by the East Sussex County Council to succeed Mr. Curzon Lewis.

During the year Mr. M. B. Crane has retired from the staff of the John Innes Horticultural Institution, Bayfordbury; it is with pleasure that we record, however, that he will continue to represent the Institution at East Malling.

We congratulate Professor T. Wallace on his election to a Fellowship of the Royal Society, it is appropriate that this honour should come to him during Long Ashton's Jubilee Year.

After three years' service as a Governing Member and on the Executive Committee as representative of the Staff Council, Mr. R. J. Garner did not seek re-election and, in May, Dr. S. C. Pearce was elected by the Council in his place.

The special programme arranged for our Governing Members on the 13th July, 1953, was attended by 20 Governors. All aspects of our research programme on pears were surveyed in a tour of the experimental plots and an account was given of plans for the wider study of the influence of fungicides and insecticides on the insect fauna of the orchard. In the laboratories recent research on plant hormones and inhibitors was described with demonstrations of the actual techniques used. The anatomical and histological studies of the Pomology Section were discussed, with particular reference to the part played by these studies in other work at the Station ; the connection between structure and rooting, and structure and resistance to woolly aphid provided interesting examples.

COMMITTEES.

There have been no changes in the membership of the Station's Committees during the year, except for the appointment of Dr. Pearce in succession to Mr. Garner on the Executive.

The Finance and Executive Committees met quarterly as usual.

The Farming Sub-Committee, electing Mr. S. R. Dixon as Chairman, met in February, mainly to consider the arable cropping programme.

The Plant Prices Sub-Committee (Chairman, Mr. W. T. Edmonds) again met in London in July to decide policy and fix prices for the distribution of surplus experimental material to Members.

All matters affecting the Station, its staff and amenities come at one time or another before the Executive Committee. Some of those not mentioned later in this Report are as follows :

Laboratory Extensions.

During the year the extensions to the laboratories have been gradually taking shape. Last year we explained that the building programme had had, perforce, to be divided into two phases, for which sanction had only then been obtained for phase 1. During the year 1952-53, the Ministry of Agriculture gave the necessary sanction for phase 2, so that we can now look forward to the completion of the whole scheme before the end of 1954.

The extension to the E.M.B. Building to accommodate the Biochemistry, Plant Physiology and Statistics Sections was completed, so that, by the end of September, we were able to start moving in. The completion of this wing enabled the Pomology Section also to expand and they are now in occupation of very nearly the whole of the old part of the building. During the year a small building was also erected adjoining the Canteen. Pending the completion of the E.M.B. Building, this housed temporarily the Statistics Section ; it now provides accommodation for the Farm Supervisor and those of the clerical staff who serve the particular needs of the research laboratories.

The new central heating plant, which is housed at the north end of the Manwaring extension, has also been completed. This installation will eventually serve the whole of the E.M.B., Manwaring and N.F.U. Buildings.

In the meantime, the further extensions and adaptations are proceeding. By the time this Report is in print the roof of the new Manwaring wing will be on. This wing will give much needed extra laboratory space for the Pathology and Plant Protective Chemistry Sections and eventually enable the Entomology Section also to expand. The linking up of the new and old wings has meant some temporary re-organization and for the time being the whole of the Entomology Section is occupying part of the Physiology Section's quarters in the new E.M.B. wing.

The N.F.U. Building, vacated by the Biochemistry Section, is, not for the first time, being adapted to new uses. It will afford an office for the Director and his Secretary at the Laboratories, provide accommodation for the Scientific Liaison Section and the reception of visitors, and also house the N.A.A.S. Fruit Specialist, Mr. W. G. Kent.

Since Bradbourne House was ready for occupation in 1940, both the Bureau and the joint Library have grown considerably and now badly need more room. When the N.F.U. Building is completed, giving accommodation for some of the staff now housed at Bradbourne, this need also will be catered for.

Members visiting the Station in 1954 may be surprised at the extent of the new buildings. The Committee would remind them, however, that these are the first new laboratory buildings to be added to the Station since 1930 and that there have been no other additions since Bradbourne House was acquired. Members do not need to be reminded how much the research staff has grown during that time. The Committee would, however, express their appreciation of the good humour with which the staff have continued their work, not only when they were badly overcrowded, but also during the difficult transitional stages of building operations.

Sports Pavilion.

With the assistance of voluntary labour by members of staff in laying the floor and terrace, we were able to put the Sports Pavilion, the shell of which was completed in 1952, in such a condition that we could use it during the summer 1953. Since then further work on the interior has been carried out by the maintenance staff. Much still remains to be done and towards this a sum of £835 is being held in reserve. Nevertheless, the cricket, tennis and hockey clubs, and indeed the Station as a whole, are already benefiting from this addition to the amenities, provided largely by the generosity of our Members.

Water Supply.

The development of a housing estate adjoining the Station has placed a strain on the main water supply in the district, which might well lead to a shortage of water, particularly for farm use in the spraying season. A scheme has been approved for the installation of two seven-thousand-gallon tanks for water storage, together with a boost pump, so that sufficient pressure can be maintained for all purposes.

Relations between research worker, fruitgrower and advisory officer.

While in the past the relations between members of the research staff and fruitgrowers have been of the happiest, and, since the formation of the N.A.A.S., many opportunities for contact with advisory officers have been made, the Committee are concerned to maintain and develop these contacts wherever possible. They desire particularly to encourage close and friendly relations between the younger generations both of growers and research workers. Occasions for joint discussions and meetings

of growers, research workers and advisory officers will be found wherever possible and the co-operation of our older Members is enlisted to interest the younger growers in the Association and in the Station. On Members' Day the research staff are now invited to attend the Members' luncheon and, so that they get to know one another, both staff and visitors are encouraged to wear an identifying label. To provide an opportunity for the younger research staff who do not often leave the Station to realize the growers' problems at first hand, a party was organized in September to visit the farms of Messrs. J. W. S. Mount and A. D. M. Hilton, at Canterbury. It is hoped to organize further visits of this kind as a regular feature of the Station's life.

Land.

Frequently since the war we have alluded to the growing shortage of land fit for experimental use and have explained the extensive "grubbing programme" of old trees that has had to be undertaken in order to free land for new experiments in future. We have now reached the stage when there is practically no suitable land on the Station that has not already been used either for fruiting plantations of top or small fruits or hops, or for fruit tree nurseries. The limited area that has been long enough under the plough is already reserved for new experiments in preparation. The Farming Sub-Committee have been considering ways and means of restoring the fertility of areas recently cleared of trees or nurseries as rapidly as possible, while at the same time bearing in mind that the crops grown should, if possible, be remunerative ones. The inclusion in the rotation of a three-year cocksfoot ley, the seed of which will be harvested for sale in one season, or heavily-manured commercial strawberries, or peas, again after heavy dunging, have been suggested. Now that less straw is produced on the farm, the buying of larger quantities for use in the bullock yard was also recommended.

Appointment of Housekeeper.

By the end of 1954 the laboratory space will have been practically doubled; the organization of the cleaning staff, which has hitherto fallen on the Secretary, to say nothing of the day-to-day domestic problems that inevitably crop up, have thus become a considerable task. The Ministry have appreciated the need for a housekeeper and, in October 1952, Miss A. M. Booth was appointed to take charge of this work. At the same time Miss Booth took over the supervision of the Staff Canteen and the Grange, including the regular inspection of equipment, recommending any replacements or renovations required to the Secretary. One immediate result of this appointment has been a notable improvement in the day-to-day running of the Canteen, the better quality of the meals being appreciated by the staff.

Soil Map of the Farm.

Two years ago we reported the completion of a large-scale topographical survey of the farm by the Survey Section of the Ministry, and that Mr. B. S. Furneaux had agreed to undertake a detailed soil survey. This survey has now been completed and Mr. Furneaux has presented his report and a series of maps, which will be included in the Research Report for this year. If we may be allowed to anticipate, we may add that he has already given the research staff a fascinating account of the soils of the Station, in which, incidentally, he warmly acknowledged the help he had received from the staff, particularly Mr. J. E. Goode.

Building Maintenance.

The maintenance staff are now so much part of the Station's organization that it is difficult to conceive how we managed without them. Mr. J. F. Towner, Chairman of the Building Sub-Committee, made his usual inspection of the properties belonging to the Station, and approved work to be done during the year. Among a variety of other tasks, our maintenance staff have effected further repairs and decorations at Bradbourne, including the strengthening of the north-east wing.

Annual General Meeting.

The thirty-third Annual General Meeting of the Governing Members was held at Bradbourne on Thursday, 4th June, 1953, under the chairmanship of Mr. T. Neame. Thirteen members of the Governing Body, twenty-three Fellows and Members of the Association, and thirteen members of staff attended.

The Director reported a resolution from the Executive Committee instructing the Station's representative on the Governing Body of the National Cider Institute to convey hearty congratulations and good wishes to Professor Wallace, Professor Barker, and all members of staff of the Long Ashton Research Station upon the occasion of the Fiftieth Anniversary of the founding of the Institute. In thanking East Malling for their message, Professor Wallace had expressed his Committee's pleasure at this token of friendship that had existed between the two Stations for so long, adding that they looked forward to many further years of close and happy collaboration in the future.

In presenting the Administrative and Research Reports for the year ending 30th September, 1952, the Director reported the very great assistance afforded by the Ministry of Agriculture and the Agricultural Research Council in enabling the Station to meet its pressing requirements for more laboratory space. In this connection, the Chairman was authorized to write to Sir Alan Hitchman and Sir William Slater expressing the Governing Members' appreciation of their interest in the Station's welfare.

The Director then reviewed the various matters in the Administrative Report, referring particularly to the recent death of Dr. A. E. Bradfield. He then passed to the Research Report, when he stressed the importance of an appropriate balance between the various facets of the wide research programme, finishing by expressing his thanks to all who had collaborated in the work of the Station during the year.

The adoption of the Reports was moved by Sir Edward Hardy and seconded by Mr. W. P. Seabrook.

The Finance Chairman, Mr. J. W. S. Mount, presented the Balance Sheet and Accounts for 1951-52, as set out in last year's Report. He explained that the Research Account should now be considered in two parts—salaries on a deficiency basis covered by the Ministry, whereas any overspending on maintenance must be met from reserves accumulated in previous years.

The Report was adopted on the proposition of Mr. B. S. Furneaux, seconded by Mr. G. T. Cook.

Messrs. J. Dix Lewis, Caesar, Duncan and Co. were reappointed auditors.

During the afternoon following the meeting, the Annual Cricket Match, Staff *v.* the Members, took place on the Bradbourne cricket ground, those Members who stayed to watch being able to do so from the verandah of the new pavilion. After a close struggle the match was won by the Members.

FINANCE.

The Research Account.

This year the grant of £98,078 19s. 6d. for salaries, which includes the revision of several salary scales in addition to normal increments, shows an increase on the previous year, but the Maintenance Grant is approximately the same as for 1951-52, illustrating the Station's efforts to maintain the economy of the previous period.

The East Malling Association's contribution to this account is slightly less than in 1951-52.

RESEARCH ACCOUNT.

1st October, 1952, to 30th September, 1953.

EXPENDITURE.	£	s.	d.	INCOME.	£	s.	d.
Salaries, National Insurance and Superannuation ..	98,078	19	6	Salaries, National Insurance and Superannuation ..	96,884	0	0
				Balance due from Ministry of Agriculture	1,194	19	6
Laboratory Expenses and Equipment	7,659	14	10	Maintenance Grant	18,828	0	0
General Maintenance Expenses	13,461	15	1	Contribution from East Malling Association	1,422	0	0
				Sundry Receipts	559	6	5
				Balance net deficit	312	3	6
	£119,200	9	5		£119,200	9	5

The Experimental Farm Account.

A summary of the income and expenditure on the Experimental Farm is given below. As has been pointed out previously, we cannot expect to cover the many expenses of a farm such as this, which is very fully used for research purposes, by sales of produce ; the Ministry are fully aware of this and are prepared to meet the difference. This year the excess of expenditure is again large ; nevertheless, the adverse balance is considerably lower than a year ago. The Committee feel that the fact reflects great credit on the Farm Supervisor and his staff, who have made a great effort to keep down the expenditure without impairing the usefulness of the farm to research. That this has been done despite the always increasing cost of labour and continuing high working charges is a real achievement.

EXPERIMENTAL FARM ACCOUNT.

1st October, 1952, to 30th September, 1953.

EXPENDITURE.	£	s.	d.	INCOME.	£	s.	d.
Farm Wages	27,563	10	10	Sale of Produce and Crops ..	22,797	2	10
Farm Manures and Sprays ..	4,399	8	9	Sale of Livestock	1,586	19	5
Livestock	1,281	0	0	Sundry Receipts	2,315	19	0
General Farm Expenses, Implements and Repairs	13,440	11	6	Balance being excess of Expenditure over Income ..	19,984	9	10
	£46,684	11	1		£46,684	11	1

THE EAST MALLING RESEARCH STATION ASSOCIATION.

The Committee have noted with some concern a small but continuing decrease in the numbers of Fellows, Members and Associates over the last three years. At the end of the year under review the total was 1,976, a decrease of 55 on the previous year.

The mutual benefit both to the Station and to fruitgrowers of a vigorous Association genuinely interested in the furtherance of horticultural knowledge is, at any rate to the bulk of its Members, beyond question. While the Committee do not feel the position is at present a serious one, they would ask the older generation among the Members to use their influence to bring the objects and advantages of the Association to the notice of the younger entrants to the fruitgrowing industry, so that the future work of the Association can be assured.

Something of what the Association has done in the past is shown in the Balance Sheet, being represented by the Station hostel, "The Grange", and four houses, a material contribution to our housing problem. The calls on the income of 1952-53 have not been quite so heavy this year. As usual there is the Research Grant (one-third of the subscriptions and donations for the previous year), a grant towards Staff Recreations, and that small but valuable service to the junior staff, the payment of evening class fees. General expenses this year are considerably lower than a year ago. As a result, the bank overdraft has been reduced from £5,762, at the end of September 1952, to £3,897.

The East Malling Association Income and Expenditure Account.

1st October, 1952, to 30th September, 1953.

Expenditure.	£ s. d.	Income.	£ s. d.
Research Grant	1,422 0 0	Subscriptions and Donations	4,029 6 9
Evening Class Fees	10 12 6	Interest on Investments ..	153 0 0
General Expenses	652 13 11	Miscellaneous Receipts ..	191 18 2
Staff Recreation	250 0 0		
Property repaired	63 14 10		
Surplus	1,975 3 8		
	£4,374 4 11		£4,374 4 11

East Malling Association Balance Sheet.

at 30th September, 1953.

	£ s. d.		£ s. d.	£ s. d.
Accumulated Members' Fund :		*Freehold Property at Cost :*		
As at 30th September, 1952 ..	15,751 19 8	"Fircroft" ..	2,577 16 5	
Add Surplus for year	1,975 3 8	"Grange" ..	6,214 17 2	
		31 Buckland Lane	2,567 1 2	
	£17,727 3 4	59 Grace Avenue	2,299 6 0	
		75 Grace Avenue	2,854 17 4	
Liabilities :				16,513 18 1
Bank overdraft	3,896 15 7	*Investments at Cost :*		
Sundry Creditors	489 19 2	£2,000 3% Funding Stock 1966–68	2,000 0 0	
		£3,720 11s. 2d. 2½% Consols ..	3,000 0 0	
		(Valuation 30th September, 1953, £4,271)		5,000 0 0
		Loan Account		600 0 0
	£22,113 18 1			£22,113 18 1

Members' Days.

Three days for Members and Associates were held with a total attendance of 450.

The Members' Day on the 25th March, 1953, was made the occasion for planting a Mulberry tree to commemorate the Coronation Year of Her Majesty Queen Elizabeth II. Members will have already seen, in the Research Report for 1952, the photograph of Mrs. F. R. Tubbs planting the tree in the round bed opposite the original office and laboratory in Great East Field. The tree was grown from a cutting, brought here by the late Dr. R. C. Knight in 1929, from the Great Mulberry in the ancient Physic Garden in Chelsea, which was in existence in 1673.

On this day the progress of research on spring frost damage was reviewed. The discussion concerned the factors affecting the liability of an orchard to damage, the breeding of late flowering varieties, the susceptibility of varieties and attempts at delaying blossoming by suitable sprays. A film was shown of the damage occurring inside plant cells during the process of freezing. Continuous sprinkling with water was described and demonstrated as a promising palliative measure for use on a small scale.

On the 30th July, 1953, the programme concerned new chemicals for the control of Apple Scab, spray damage, the control of apple aphids, and developments in the methods of applying fungicide sprays; a demonstration was given of atomizing concentrated lime sulphur on to Cox's Orange Pippin trees and the healthy trees produced by the treatment were shown.

Wet weather on the 24th September, 1953, caused a change in the plans for the day on soil moisture relationships and instead of spending most of the time in the plantations, the talks were given in Bradbourne House with only a brief visit to one of the field trials. The programme dealt with the availability and amount of soil moisture and methods of calculating moisture deficits as a guide to irrigation. Experiments with strawberries and apples were surveyed and practical suggestions made for growers who might wish to irrigate their own plantations.

Amos Memorial Lecture.

Professor Tukey having delivered the fifth lecture during September 1952, as reported last year, there has been no lecture within the period of the year under review. The sixth lecture will be given by Professor R. H. Stoughton at Wye College in November 1953.

Staff.

It is with sorrow we report the sudden death early on Sunday morning, 3rd May, of Dr. A. E. Bradfield, senior organic chemist in the Biochemistry Section. A detailed obituary will be found in the Research Report. Here it is only possible to record that, during the four and a half years that he was with us, Bradfield not only laid the firm foundations of future research on the organic constituents of fruit plants, but found his way into the hearts of all who came into contact with him. Whether it was service on the Staff Council or participation in some social activity, he was always ready to play his part. As a colleague and friend he was with us too short a time and we shall miss him very much.

In the Pomology Section, last year we noted the marriage of Miss M. H. E. Davies; her studies on biennial bearing has now been taken up by Mr. R. M. Fulford who joined us on the 1st October, 1953. Dr. R. L. Knight, who is due to join our plant-breeding team in May 1954, visited us for a fortnight in July. Mr. J. P. Ruxton, who has been working on the frost investigations since September 1950, resigned in August to take

charge of science teaching at King's School, Gloucester. He has taken with him Miss J. Burton, who has been an Assistant (Scientific) in the Section for five years and is now Mrs. Ruxton. Our good wishes go with them both.

Miss M. J. Hall came to us from Scotland to join the Statistics Section on the 1st October, 1953, to help with the detailed analyses of long-term experiments and supervise, under Dr. Pearce, the computing staff.

Mr. H. J. Lacey joined the staff of the Physiology Section in May for work on both field and laboratory experiments.

Among the staff of the Institute of Plant Physiology, Imperial College of Science, working at the Station, it will be noted that Dr. Bolas, Dr. Ruck and Miss Macnamara, who have hitherto been working with the Biochemistry Section, are now attached to the Physiology Section.

Dr. F. W. Andrews, lately chief economic botanist in the Sudan Government Service, came in August to take up the work on host parasite relations directed towards the control of the economically important diseases of hops and fruit. We congratulate Mr. R. Cropley on the award of the National Diploma in Horticulture with honours. He submitted a thesis entitled "The selection of virus-free clones of fruit plants in Britain".

We congratulate Dr. A. M. Massee on the award of the Ridley Gold Medal by the Worshipful Company of Fruiterers.

Mr. R. C. Muir was appointed to the Entomology Section on the 1st October, 1953. He will study the ecological problems of insects associated with cultivated plants. Miss D. E. Griffin, who was attached to the Plant Protective Chemistry Section for work on the bio-assay of insecticides, resigned in November 1952 to take up duties as entomologist at the Imperial College Field Station, Silwood Park, Berks.

A new heading appears in the Staff List this year: Fruit Storage Investigations, a note concerning which is included under Collaboration. Dr. B. G. Wilkinson joined the team working with Dr. Montgomery and the Ditton Laboratory in September.

In the same month we welcomed the return of Mr. A. E. H. Rutter after taking his degree at Cambridge University; he now joins the Scientific Liaison Section.

There have been no further changes in the senior research staff nor in the staffs of the farm or of the administration, apart from the appointment of Miss Booth, already alluded to.

Naturally there have been several changes among the Assistants (Scientific) and the junior clerical staff. Of those who have left us, some have got married, one has been called up for National Service and another has joined the Women's Police Force. All the changes are set out in the List of Staff at the beginning of this Report.

There have been no changes in the senior staff of the Bureau.

As in previous years we extend a hearty welcome to all those who have joined us during the year, while those who have left take with them the good wishes of us all.

Again we thank those members of staff who assist the Director by serving on the various internal committees of the Station that are so valuable in our organization. We are glad to report that the officers of these committees are unchanged. In this connection we would mention in particular the Canteen Advisory Committee (Chairman, Mr. Argles; Secretary, Mr. Wills), most of the members of which perform some voluntary task for the benefit of their colleagues as well as attending the monthly Committee meetings, and have now served for two consecutive years.

Social and Athletic Activities.

As has been mentioned, the Pavilion has been in use for the first time this season and is much appreciated by the various athletic clubs. The Association has again made a generous grant towards staff amenities that enables us to meet needs for equipment which could not be covered by the ordinary club subscriptions.

Dr. Pearce, being elected as Staff Representative in June 1953, resigned the office of Social Secretary and was succeeded by Mr. A. C. Mason, to whom fell the task of organizing the various summer events.

As usual the Great Hall was crowded for the Christmas Party which was held on the 18th and 19th December. Miss Seymour again produced a much-appreciated variety show, which was followed by an informal dance organized by the Dance Club. Although this Club laments that, apart from an Old Time Dance in February, there was insufficient support for further dances during the year, it is a tribute to their efforts that when the Standing Committee mildly suggested the omission of a dance following the Christmas Party in 1953, there was an immediate demand that it should be included, which could not be denied.

Strangely enough, the number of children attending the Party on the one fine day in a week of bad weather in July remained the same as last year, about 130. Looking back, we get a little confused between the events of one Children's Party and its predecessors—they have all been such fun. One abiding memory of all parties, however, is the popularity of rides on the apple-box railway to the exhaustion of the helpers and ruin of the modern storage box, which does not seem to have been built for this purpose. On this day also, the members of the Boat Club literally put their backs into the job of giving the children a good time.

The athletic clubs have all had enjoyable seasons. The Hockey Club, which held its first match against the Members in April, played 13 matches for mixed teams, while the ladies had 4 matches on their own.

The Cricket Club played 25 matches in all; they are looking forward to an increased membership in 1954. The Tennis Club, which had 31 members playing regularly, report a most successful season, in which they played 13 matches. The Table Tennis Club will perhaps attract more members when it is possible again to release part of the old packing shed for lunch-time practice. As it is, they ran a knock-out tournament and played 7 matches.

The gardeners were as usual very active, as a result of which 51 competitors produced 245 exhibits at the Club's Annual Produce Show; but we hope to see more entries in the vegetable classes another year. Three excursions were arranged and the club officers again helped members in numberless ways throughout the year.

The social clubs have been well supported and both the Music and Play Reading Clubs arranged expeditions for their members and friends. There were 9 gramophone concerts and a "live" concert of chamber music; the Music Club hopes to extend its repertoire with a player for long-playing gramophone records. The Play Reading Club read 14 plays and held its usual hilarious Christmas Party. There were two Square Dances organized by the Folk Dance Club, to each of which some 30 people came. The Chess Club has broken out in a fresh place, by conducting a postal match against Rothamsted—at the time the Secretary reported we were one pawn up and expected to force our opponents to resign by Christmas! Finally, a very brief report states that the small Photographic Club continue to avail themselves of the privilege of using the studio.

Altogether a reasonably good year, though we feel there must be many members of staff who do not realize how much our Clubs have to offer them, and we hope to hear of increased membership all round, next year.

Postgraduate Students.

It is with great regret that we record the death of one of the first of our overseas research students, Dr. R. C. Palmer, Superintendent of the Dominion Experimental Farm, Summerland, B.C., Canada. Dr. Palmer came to the Pomology Section in the autumn 1931, and although he was unable to stay long enough to take a higher degree here, he entered enthusiastically into the life of the Station and left behind him an abiding memory with those who had the privilege of working with him.

Mrs. J. Tully (*née* Joan Hearman) of the Griffith Research Station, Australia, who took her Ph.D. degree here in 1936, paid us two short, but very welcome, visits.

We are now passing through a phase when, owing to the rebuilding operations in progress, we can only accept a very few long-term students and we have had to refuse all those who applied to come for short periods for the time being. The completion of the building programme will ease the situation, but the ever-growing demands on senior members of staff to guide their large permanent teams must not be forgotten and, for this reason, the number of students we can accept may never be very large.

Candidates for Higher Degrees and other Long-term Students.

In October 1953 there were seventeen postgraduates registered with the University for higher degrees. Of these, fourteen were members of staff and three students, two from Canada in the Physiology and Entomology Sections and one from New Zealand in the Pomology Section.

In May, Mrs. Naunton-Davies (*née* Miss M. H. E. Davies) was awarded a Ph.D. degree by London University for a thesis entitled " Biennial and regular bearing in the Apple ".

In the same month, Mr. D. W. P. Greenham was awarded a Ph.D. degree by Cambridge University for a dissertation in two parts: " (*a*) Relation between the chlorophyll content of *Chlorella* and rate of photosynthesis at low intensities of illumination; (*b*) Effects of grass swards and other cover crops on apple trees ". The work for the latter part was done at East Malling.

Among the Imperial College staff working at East Malling, Mr. H. C. Ruck was also awarded a Ph.D. degree in February for a thesis entitled " Some aspects of plant metabolism in the potato as affected by manganese supply ".

We congratulate all three on their success.

Mr. N. Lee completed his three years' course in the Pomology Section in October 1953. Mr. D. W. Way, a student of the Royal Horticultural Society, completed a year's study with us in September, during which he was successful in passing the final examination for the National Diploma in Horticulture (Fruit).

Temporary Recorders.

During 1953, we received forty-seven applications for fifteen vacancies, each for four weeks during the summer vacation. This scheme, whereby University students receive practical experience of field experiments and we ourselves obtain much-needed assistance at peak periods, continues to be popular. It is evident that several of those who come to us for these periods may later on join the ranks of research workers and the reports on their work this year have been uniformly good.

Six of these recorders worked with the Pomology Section, three with Physiology, three with Entomology, on special investigations here or in Essex, and three in the joint team, which records experiments conducted by all the three Sections concerned with the control of pests and diseases.

Students came from the Imperial College, Wye College, Studley College, Cambridge, Bristol, Reading and Nottingham Universities, and from the University College of the South-West, Exeter.

During 1952, three members of the National Agricultural Advisory Service spent a year at East Malling undergoing a special training as fruit recorders. These three have since been appointed to the Experimental Horticulture Stations at Luddington, (Warwickshire), Efford (Hampshire), and Stockbridge House (Yorkshire). Three more recorders came to East Malling during the summer 1953 and are now undergoing the same course, prior to appointment at one or other Station when their training is completed.

Plantation Assistants.

There is still a waiting list of would-be plantation assistants and we now have five girls and seven men. Among them is Mr. P. Harrison, whom we must congratulate on passing his N.D.H. intermediate examination.

Most of the plantation assistants stay for the full two-year period, during which they perform many tasks in connection with our experiments in the field. Thanks to the efforts of Mr. A. C. Painter, who now has the help of Mr. A. E. H. Rutter, they enjoy a series of winter lectures, contributed by members of the research staff and others ; they also have a few expeditions to horticultural shows and places of interest.

Most of those who have left this year are working in commercial horticulture, but we note that one has joined the staff at Luddington for a year. We enjoy meeting former plantation assistants on Members' Days and, even though some of us cannot remember their names, they are assured of a warm welcome.

Staff Discussions.

During the year seven staff discussions were held. In the first, following his trans-Atlantic tour in 1952, Dr. H. B. S. Montgomery spoke about " Fruit Growing, Research and Education in the United States ", and in the next Mr. T. N. Hoblyn and Miss J. R. Groves spoke about research they had seen in progress in Holland and Belgium. Later discussions concerned the work at East Malling, the subjects being : Bacterial canker of *Prunus* species, water requirements of fruit plants, the integration of chemical and biological control in the apple orchard, mycorrhiza, frost damage to plant tissues, and natural auxin.

Research Tours.

Following the Biometrics Conference at Bellagio, Dr. S. C. Pearce visited a number of Institutes where there have been recent developments of statistical interest. These included the Montecatini Laboratories, Milan, Italy ; the Horticultural Institute, Gembloux, and Brussels University, Belgium ; and the Institute of Horticultural Plant Breeding, Wageningen, Holland.

In July, Dr. A. F. Posnette made a tour of Institutes where research in fruit plant virus diseases is in progress in Switzerland and in Holland. These included the Stations at Lausanne, Pully and Wädenswil, Switzerland ; the Institutes for Phytopathological Research and Horticultural Plant Breeding, Wageningen, and the Zeelands Station, Wilhelminadorp, Holland.

After taking part in the XIV International Congress of Zoology at Copenhagen, Dr. R. S. Pitcher visited members of the I.P.O. Laboratory, Amsterdam, Holland, to discuss nematological problems and techniques, as well as field problems in nematology and entomology.

These three visits abroad were financed by grants from the Agricultural Research Council.

At the request of the South African Government, Dr. W. A. Roach was given leave of absence in order to visit South Africa at the end of October and advise Messrs. African Explosives and Chemical Industries on the extent of trace element deficiencies in the main crops grown in the Union and on necessary investigations. He returned to the Station in February.

During a leave period, Dr. I. Modlibowska visited the Fruit Research Station at Firenze, Italy.

At home, members of staff paid many useful visits to Research Institutes and Experiment Stations. Mr. Grubb inspected raspberry trials in Scotland and Devon; Mr. Garner went to the West Midlands to see nursery and topworking trials; and Dr. Greenham inspected orchard swards in many counties. Dr. Posnette and Mr. Crosse toured the West Midlands examining the virus and Bacterial Canker situation in stone fruit orchards.

Collaboration.

It is always difficult to write this section of the Report, for so many of the projects that come under this heading continue, as does all research on tree fruits, for so many years that if, as yet another season is completed, we were to mention them all, this Report would be even longer than it is now.

In 1953, we must undoubtedly give pride of place to our oldest collaborators of all, the research team at Long Ashton, which celebrated its fiftieth anniversary this year. The messages of goodwill that passed between the two Stations made warm references to the collaboration over the past forty years; but, perhaps, what we liked best was the open invitation to the staff to attend the Jubilee Celebrations at Long Ashton on the 23rd July, which the Chairman and some thirty-four members of the staff and Bureau were able to accept (most of them travelling through the night to do so). On such a crowded day, the warm welcome we received and the special tour of the plantations organized for us, were very much appreciated.

From Long Ashton to Hurley. We do not think we have mentioned the Grassland Research Station in these notes previously, but evidently we now have many problems of mutual interest involving orchard swards. Another bus party of thirty-two members of staff visited Hurley on the 31st July and we look forward to a return visit in 1954. This promises to be the start of another long series of collaborative enterprises.

The Ditton Laboratory, our nearest neighbour, a part of the Cambridge Low Temperature Research Station, was sited alongside East Malling Research Station with a view to obtaining fruit of known history for storage work. Since the beginning of the war, however, relatively small amounts of fruit have been supplied to Ditton for experimental work. It is, therefore, particularly pleasing to report that a joint research programme has been drawn up to study the influence of orchard factors on the storage behaviour of apples. This research is needed to help in extending the storage life of Cox's Orange Pippin, increasingly urgent as the many acres of young Cox's, planted since the war, come into full bearing. Dr. Montgomery has taken charge of the work from the orchard factors side of the problem and a plant physiologist, appointed

to the staff of East Malling, is working in the Ditton Laboratory on the physiology and chemistry of the picked fruit. The work is linked with research at Ditton on the so-called "lenticel rots" and on improved techniques of storage, in connection with which at the time of writing the Station has appointed a further plant physiologist to work at Ditton.

In collaboration with Messrs. Guinness, a new experiment has been started at their farm at Bodiam, Sussex, on the effect of grassing down on the spread of Verticillium wilt of hops.

The A.R.C.-Pettar-ACE Red Spider Investigations in Essex have now completed their tenth and last season, the purposes for which the investigations were initiated having been achieved. The full story of these ten years in Essex has yet to be written but, when it is completed, there will be described a piece of collaborative research which is in many respects unique. Next year we may be ready to say more, but, for the present, we must confine ourselves to thanking the Essex Institute of Agriculture and Mr. L. H. Clark, who generously placed plantations at Writtle and Galleywood at the disposal of the investigations in 1953.

Nearly all the other collaborative projects have been mentioned in previous Reports and our friends will forgive us if we do not mention them again individually. They range from long-standing and very close associations, such as that we enjoy with the Imperial College team, to the supply of virus-tested plants for special research or fruits for preservation experiments. Many of them are with the various branches of the National Agricultural Advisory Service the National Fruit Trials at Brogdale, and the five Experimental Horticulture Stations, and we have numerous contacts with advisory officers in the field.

Some of these projects have been initiated by the action of the Agricultural Research Council or the Ministry of Agriculture; more often they have arisen through the mutual interest of two or three research workers in particular lines of work. To this end every opportunity is taken for our research team to meet those at other Stations, for such collaborations, by their very spontaneity, are often the most fruitful of all.

Once again, we end this section by saying—Thank you.

Outside Trials and Demonstrations.

Many trials on growers' plantations that we have reported in previous years have continued during 1953, and we are grateful to the owners for the facilities placed at our disposal.

As reported elsewhere, during the winter 1952-53 the first large-scale distribution of five new apple rootstocks, four of them highly resistant to woolly aphid, was made to fruit-tree nurserymen. It will be several years yet before trees on these rootstocks will be generally available; by that time, however, we hope to have established trees on these rootstocks growing on various soils distributed throughout the country, so that fruitgrowers can see them for themselves under many different conditions and compare their growth and cropping with trees on the well-known rootstocks of similar vigour. With the co-operation of the N.A.A.S. Provincial Fruit Specialist officers and growers, five demonstration sets of such trees of Cox's Orange Pippin and Laxton's Fortune were planted during 1952-53 in Essex (boulder clay with chalk), Hampshire (medium loam on the Upper Greensand), Norfolk (alluvial type medium sandy-clay loam), Devonshire and Herefordshire, the last two both being on a medium loam over the Old Red Sandstone. As we write, arrangements are being made to plant at least ten further sets of trees of Cox's Orange Pippin and Worcester Pearmain during the winter 1953-54.

By arrangement with Mr. F. Waterman at Hunton, Dr. Vanstone has been taking leaf samples from Laxton's Superb trees in all phases of biennial bearing.

Two additional observation plots for the study of hop virus diseases have been established.

The study at Church Farm, Ryarsh, of the effects of lime sulphur and wettable sulphur, as opposed to other modern fungicides, upon the predators of the Fruit Tree Red Spider Mite, especially the Typhlodromid mites, has been continued for a final season. We are grateful to Mr. L. Hooson for his co-operation during the three years of this trial.

In addition to the trials at Teynham and Ash in Kent on the control of the Summer Fruit Tortricid, ecological investigations are being conducted in derelict orchards near Foulham and at Maldon in Essex.

Outside Committees.

The number of research, advisory, and technical committees and conferences on which the Station is represented by one or more members of staff continues to grow and has now reached 70. Some of these commitments take up considerably more time than is necessary for the mere attendance at meetings.

During the year the Director has been invited to join three more committees and has been elected Chairman of the Brogdale Station Technical Committee. A new A.R.C. sub-committee of the Mineral Deficiencies Conference on comparison of methods for diagnosis and analysis has been set up and Mr. Mason and Dr. Vanstone represent the Station on it. Dr. Posnette has been elected to the Council of the Association of Applied Biologists. Mr. Crosse has been appointed to the A.A.B. Plant Pest and Diseases, and to the British Mycological Society's Plant Pathology Committees.

Scientific Societies and Conferences.

Dr. R. S. Pitcher attended the XIV International Congress of Zoology at Copenhagen, where he read a paper on an association between certain nematodes and a fungus in strawberry disease.

Dr. S. C. Pearce attended the Third Biometric Conference at Bellagio, Italy, and read a paper on behalf of Mr. T. N. Hoblyn and himself on the design of successive experiments in fruit plantations.

Dr. W. S. Rogers and Dr. Irena Modlibowska presented their film on the freezing of plant tissues under the microscope at the Seventh Congress of the International Scientific Film Association in London.

Dr. A. F. Posnette attended the Cocoa Conference in London.

Papers were read by Dr. A. M. Massee and Dr. Elsie Collyer at the joint meeting of the Association of Applied Biology and the Society of Chemical Industry on Biological and Chemical Control. Mr. J. E. Crosse took part in a symposium on host-parasite relationships, arranged by the British Mycological Society, and at the Society of Experimental Biology, Mr. H. W. B. Barlow contributed a paper on the chromatography of growth substances in apple shoots ; at another meeting of the latter Society, Drs. Rogers and Modlibowska spoke on frost damage and also showed the film on freezing of plant tissues. Dr. Greenham read a paper on herbage mixtures for orchards at a conference of N.A.A.S. Grassland specialist officers.

Members of staff took part in official meetings in connection with plant certification, nuclear stock organization, Verticillium wilt of hops, fungicides, Strawberry Yellows,

microbiology of the rhizosphere, bird damage, and experiments at the N.A.A.S. Experimental Horticulture Stations.

Many other meetings of learned societies and conferences of research workers, advisers and fruitgrowers were attended and contributions were made to the discussions.

Advisory Correspondence and Visits.

A total of 1,865 letters seeking advice were received during the year, a slight drop on last year's total. The majority of these were answered by the Scientific Liaison Section with assistance as necessary from the specialized research workers, leaving some 400 that were dealt with personally by research workers ; many of these came from specialist officers of the N.A.A.S.

Enquiries by telephone have been as numerous as ever. The total of 82 advisory visits showed little change from last year's figure.

Exhibits.

The exhibit at the Chelsea Flower Show dealt with research into propagation by hardwood cuttings. Specially grown specimens showed the response of different kinds of cuttings to treatments with plant growth substances and stressed the importance of the source of the cuttings.

At the Tunbridge Wells Agricultural Show scale models of the root systems of three excavated apple trees were displayed with monoliths of the soil on which the trees were growing. This exhibit was substantially the same as that at Chelsea in 1952, but, from the interest aroused, most of those attending the Tunbridge Wells Show had not seen it at Chelsea.

An exhibit on the repeated changing of treatments in trials with long-lived species was staged at the Third Biometric Conference at Bellagio, Italy, and supplemented the paper read at the conference by Dr. Pearce.

Visitors.

The total number of visitors recorded, 2,469, shows little change from last year, but visitors as individuals were fewer and more numerous as parties. The Local Day, held on a Wednesday in June, was poorly attended, only some 50 people coming to see round the Station.

It would be impossible to list all our visitors, but we would like to record with special pleasure the visits of Dr. W. Davies, Director of the Grassland Research Station, Hurley ; the Hon. T. Playford, Premier of South Australia ; Mr. Cameron, Speaker of the Australia House of Parliament, Canberra, and Mrs. Cameron ; Sir Reginald Franklin, Deputy Secretary, Ministry of Agriculture ; Dr. J. H. Craigie, Chief of the Division of Botany and Plant Pathology, Canada ; Mr. and Mrs. R. C. Parent, the Experiment Station, Charlottetown, Prince Edward Isle, Canada ; Mr. F. Waldo Walsh, Deputy Minister of Agriculture, Nova Scotia ; and Mrs. Joan Tully (*née* Hearman), of the Griffith Research Station, Western Australia.

Amongst the parties, we received the Royal Institute of Chemistry, the Biometric Society, the Cultural Section of the A.R.C. Social and Athletic Association, the Wye Conference of Directors of Agriculture in the Colonies, 30 fruitgrowers from Sweden, 50 nurserymen from France, 8 members of a South Africa Farmers' World Tour, and parties of horticultural students from France, Holland, Norway, Birmingham, Nottingham, Reading, Wye and London.

The dress rehearsals that preceded all three Members' Days this year were each attended by just over 40 advisory officers of the N.A.A.S. and the Local Education Authorities. We believe these rehearsals are a valuable medium for mutual discussion between research worker and advisory officer. The annual two-day visit of a third of the N.A.A.S. horticultural staff provides another valuable opportunity for personal contacts as well as for gaining information about the research in progress; it is gratifying to find the members attending have gradually increased from the original 40 until now there are about 60. The usual courses have been run for small groups of N.A.A.S. officers concerned with plant certification. In all, over 200 horticultural officers visited the Station in these ways, apart from day-to-day visits of individual officers.

Attendance at Members' Days, not included in the above figures, amounted to 470.

Lectures and Demonstrations.

Forty-one lectures have been given to growers and students in various parts of the country, including one in Scotland. Two members of staff have again acted as tutors in plant biology at the Westonbirt Summer School (London University) and another gave a series of lectures on fruit insects to the horticultural students of the Essex Institute of Agriculture. Dr. Rogers took part in a discussion with Mr. C. P. Norbury on frost damage to fruit, which was broadcast in the B.B.C. Home Service in January 1953. On the 12th March the Station was presented to listeners by the B.B.C. in a recorded programme dealing with the breeding and selection of the new woolly aphid resistant rootstocks for apples. In this the Director with five members of staff were recorded at the Station in brief unscripted descriptions of various aspects of the work. The programme was part of a series entitled "What's going on?", which consisted of recordings at each of the main agricultural and horticultural research stations. Dr. Massee led two unusual farm walks in Kent, in which the objective was to demonstrate various pests present in orchards so that growers could assess their own pest problems more accurately.

A refresher course was run for N.A.A.S. officers concerned with the certification of fruit tree rootstocks and assistance was given with the courses for hops certification in the South East and West Midland provinces respectively.

Six members of staff judged at the leading commercial and amateur fruit shows, and one examined in the N.D.H. finals in Section III, Fruit Crop Husbandry.

Distribution of Experimental Material.

The main purpose of the experimental nurseries is to produce the wide variety of plants and trees needed by a large research staff, all of whom are concerned with growing plants in the field in one way or another. To this must be added the task of meeting the very numerous requests for small fruits, rootstocks and trees of all kinds from other research and experimental institutes at home and abroad. Thus the bulk of the small fruits and trees planted during the last three years on N.A.A.S. Experimental Horticulture Stations have been supplied by Long Ashton, the National Fruit Trials, Wisley, and ourselves. Many of these plants need very special nursery treatment, such as can only be guaranteed at a Research Station, and for this reason we shall always do our best to supply such material when we are asked for it.

In future the main items likely to be offered in our Members' Distribution List are new varieties of fruit plants raised at the Station or mother trees of existing varieties that have been selected as free from virus, often after a long and patient search, as they become available. We trust that Members will realize the value of this material which, if possible, is always offered to them prior to general distribution.

During 1952-53, as forecast last year, the five most promising new rootstocks in the Malling-Merton series, four of them highly resistant to woolly aphid, were distributed in bulk to fruit-tree nurserymen in the United Kingdom who had promised to lay them down as stoolbeds. Thus they should be available in large numbers for the industry when they are released for general distribution in the autumn 1955. Some 83,000 first and second grade layers were sent out, the remainder being bedded here for a further season. During 1953-54 the same five rootstocks are being offered to all Members of the Association in small or large quantities. We hope many of these will be planted for stoolbeds also. Further sets of the whole 15 varieties in small quantities are also being sent out during 1953-54 to research institutes abroad that have expressed a wish to test them under their conditions. Many of these rootstock varieties may never be found useful for this country, but, on the other hand, they may have particular qualities that make them valuable abroad. Demonstration sets of rootstocks for identification are to be sent to N.A.A.S. authorities and, as stated elsewhere, sets of trees worked on them are being planted in many fruitgrowing districts.

During 1952-53 also, the apple variety Michaelmas Red was offered to Members for the first time, either as worked trees or graftwood. Amos Black blackcurrant and Mr. Grubb's black/red hybrid raspberries were in demand ; but apart from these there was a poor demand for surplus nursery material.

An important item in the 1953-54 distribution is the offer of virus-free mother trees, for use as sources of scionwood for working on virus-free rootstocks, of four well-known cherry varieties high-worked on F12/1 stems or low-worked also on F12/1 ; with them there are also available virus-free F12/1 rootstocks, for the use of those who wish to build up a clean stock. Although some of the cherry viruses may not be of first importance, others are already known to have serious effects ; thus it is very desirable that cherry growers should have clean stock as soon as possible with which to plant up new long-lived orchards. This is a start ; we hope virus-free selections of other varieties will follow.

Station's Publications.

Publications during the year numbered 78, with 56 scientific contributions and 22 more popular technical bulletins. These are all listed in Part II of the Research Report.

Journal of Horticultural Science.

Regular quarterly publication was maintained and the whole of Volume XXVIII was published during the year. This volume was a little larger than its predecessor, containing 28 papers, of which 7 were from East Malling and 7 from Long Ashton. The Editors are gratified that the higher subscription for this volume has caused no serious falling-off in the number of subscribers. The higher income that resulted, together with a grant from the Royal Society, has enabled the volume to be published without loss.

For the second year in succession, fewer papers were received than previously. At the present time there is no accumulation of papers awaiting publication and this means that the delay between receipt and publication is much reduced. The Editors are concerned, however, that the flow of new manuscript should be maintained, so that regular publication can be continued.

During this year several members of the Publication Committee have undertaken to assist the Editors with the detailed editing of papers on special subjects ; this is already having a marked effect on the standard of papers published.

Library Committee.

The statistics for the year were : 3,392 items borrowed from the library, including 602 books, 686 journal parts, 906 bound journals, 1,198 pamphlets and reports ; 621 journals circulated to Sections automatically ; 27 photocopies and 369 loans obtained from outside libraries ; 540 lent to outside libraries, organizations and persons. 1,315 pamphlets, 143 bound journals and unrecorded quantities of loose journal parts and reports were added to the Station library ; 13 books were purchased and several others received as gifts.

The gifts included a very interesting item in Truchsess von Wetzhausen's *Systematische Classification und Beschreibung der Kirschensorten,* 1819, presented by Mr. T. Neame. One or two gifts take the form of the regular presentation of a current journal, and among pamphlets may be mentioned a quantity from the collection of Mr. N. H. Grubb. It is the pleasant duty of the Library Committee to acknowledge with thanks all these and many other welcome gifts.

The need for expansion is becoming more urgent. It is obvious that additional shelving and somewhere to put it would lead to greater ease in locating store and other material and would be very advantageous to all.

The following additional figures relating to the Commonwealth Bureau of Horticulture and Plantation Crops' literature, which for all practical purposes forms part of the library, may also be of interest. Additions to stock : books, 63 ; pamphlets, 1,038 ; journal parts and annual reports, unrecorded quantities. Periodical journals currently received in the joint library are 308 Research Station and 350 Bureau, some of them being duplications.

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